

CHEMICAL AND PHYSICAL PROPERTIES

The areal distribution of dissolved-solids concentration, temperature, primary water type, and pH are shown on maps and discussed in the following sections. The dissolved-solids concentrations and temperatures are shown for the area of permeable zone A. The existence of geophysical well logs (Grubb, 1966, and Wilson and Homan, 1988), both onshore and offshore, make it possible to estimate both dissolved-solids concentrations and temperatures throughout a large area where data from water samples are not available. Primary water type and pH generally are not shown offshore because of a lack of data.

Dissolved-Solids Concentration

The concentration of dissolved solids in water from the alluvial aquifer and permeable zone A ranges from 203 mg/L in the alluvium south of the Mississippi River to about 30 mg/L offshore of Texas and Louisiana (table 1). Thus, the concentration of dissolved solids increases in a downstream direction (fig. 5). The largest increase occurs at about middistance in permeable zone A.

Although most of the alluvial aquifer has concentrations of dissolved solids of less than 500 mg/L, there are areas in the southern part of this unit where the concentration ranges from 500 to 3,000 mg/L The updp limit of permeable zone A in Louisiana and eastern Texas also has concentrations of dissolved solids ranging from 500 to 3,000 mg/L The increase in concentration to 3,000 mg/L is attributed to mineral-water interaction.

The concentration of dissolved solids increases from 50 to 100 mg/L in less than 10 m in western Texas and in about 50 m in most other areas of permeable zone A. This large increase in concentration is attributed to the presence of saline water from the discharge of evaporites comprising salt domes. Most of permeable zone A is underlain by the gulf coast salt dome basin and about 50 salt domes penetrate the base of this unit (Beckman and Williamson, 1990).

Concentrations of dissolved solids that exceed 10,000 mg/L are offshore on the Continental Shelf. The area on the Continental Shelf east of the Sabine arch has concentrations of dissolved solids of less than 35,000 mg/L whereas west of the Sabine arch the concentrations exceed 35,000 mg/L.

Temperature

The temperature of water from the alluvial aquifer and permeable zone A is less than 10 degrees Celsius in the alluvial aquifer and the updp limit of permeable zone A (table 1). Generally, where the concentration of dissolved solids is less than 1,000 mg/L the water temperature is less than 10 degrees Celsius (fig. 5). In permeable zone A areas where the concentration of dissolved solids ranges from 1,000 to 35,000 mg/L the temperature of ground water increases from 10 degrees to 30 degrees Celsius. Water temperature exceeds 30 degrees Celsius in the Continental Shelf areas.

Primary Water Type

The primary water types in the alluvial aquifer and permeable zone A, which is based on the most frequently observed type (mode) per 100-square-mile area, are predominantly sodium bicarbonate in permeable zone A and predominantly sodium bicarbonate in permeable zone A east of the San Marcos arch (fig. 6). Southwest of the San Marcos arch the primary water type is sodium chloride.

pH

The pH of water from the alluvial aquifer and permeable zone A generally ranges from 5.1 to 7.0 in western Texas and eastern Louisiana and the updp limit of permeable zone A. There are areas in the central part of the alluvial aquifer and in the downdp part of permeable zone A where pH ranges from 8.0 to 9.0 (fig. 7, table 1). However, for the rest of the area of study, the pH ranges between 7.0 and 8.0. There may be no apparent trend in pH except lower values along the boundary of the alluvial aquifer and along the updp limit of permeable zone A.

CHEMICAL CONSTITUENTS

The areal distribution of eight constituents in ground water are shown on maps and discussed below. The constituents mapped are the major chemical components in ground water from the Gulf Coastal Plain. Lines of equal concentration of constituents generally are limited to onshore areas of the aquifer or permeable zone because chemical data generally are not available offshore.

Calcium

The concentration of dissolved calcium in the alluvial aquifer and permeable zone A ranges from 0.9 to 900 mg/L (table 1). In the alluvial aquifer the concentration generally increases from the boundary of the aquifer to the Mississippi River (fig. 8). In permeable zone A the concentration generally increases from the updp limit to the downdp limit of the data in southeastern Mississippi and Louisiana.

The concentration of dissolved calcium in the alluvial aquifer generally ranges from 10 to 50 mg/L along the western boundary of the aquifer and increases to a range of 50 to 200 mg/L along the course of the Mississippi River. In the area of permeable zone A north of the Sabine arch in eastern Mississippi and Louisiana the concentration of dissolved calcium generally ranges from 10 to 50 mg/L along the updp limit to 200 mg/L in a downdp area along the coastline of southeastern Louisiana.

From the Sabine arch southwestward to the San Marcos arch the concentration of dissolved calcium ranges from about 10 to 100 mg/L with no apparent pattern or trend. From the San Marcos arch southwestward to the Rio Grande the concentration ranges from about 50 mg/L near the arch to 900 mg/L in areas south of Klingerville, Texas.

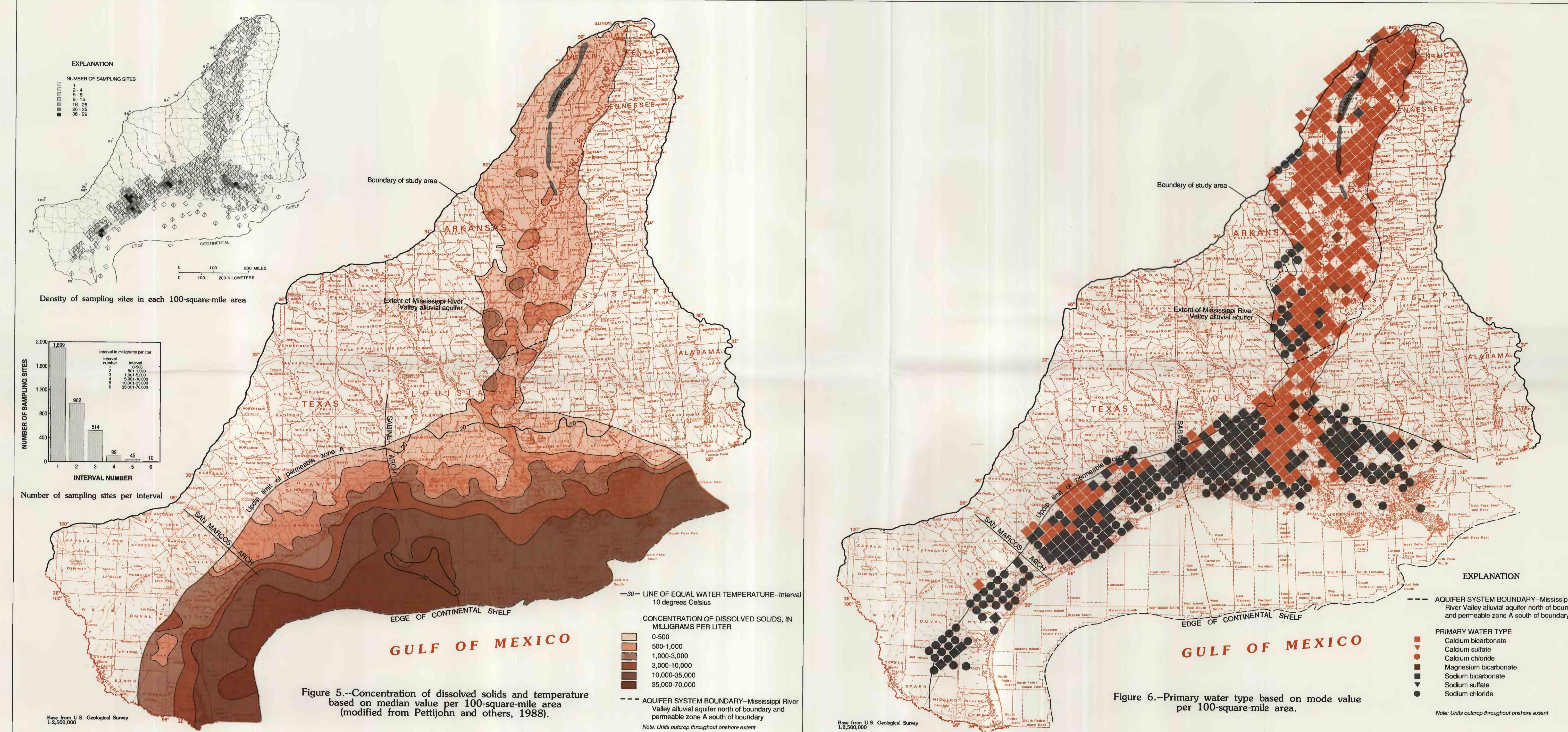
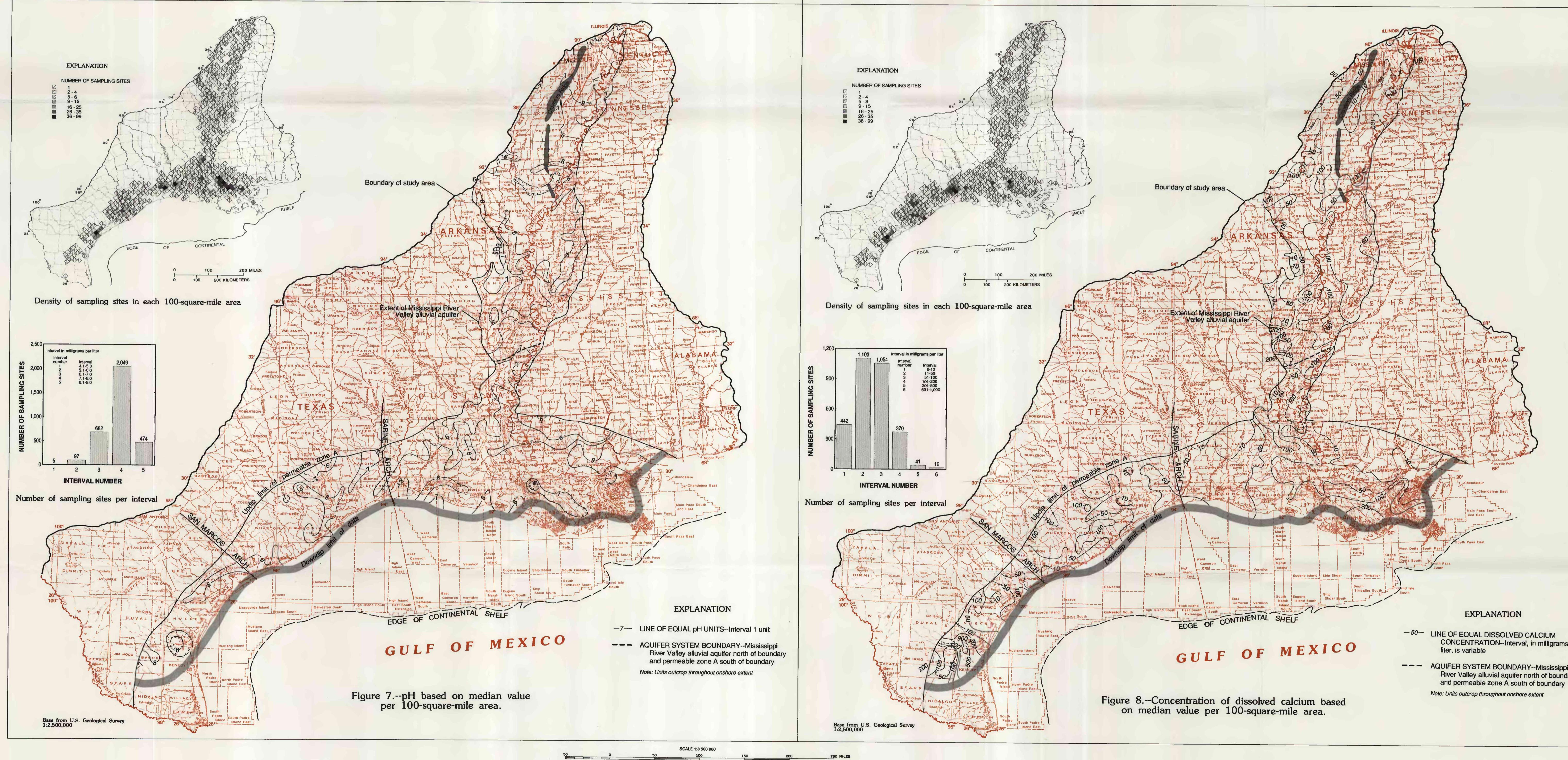


Figure 6.--Primary water type based on mode value per 100-square-mile area.



PROPERTIES AND CHEMICAL CONSTITUENTS IN GROUND WATER FROM THE MISSISSIPPI RIVER VALLEY ALLUVIAL AQUIFER AND PERMEABLE ZONE A (HOLOCENE-UPPER PLEISTOCENE DEPOSITS), SOUTH-CENTRAL UNITED STATES.

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1992